

## Meter-Long Plasma Source for Heavy Ion Beam Space Charge Neutralization

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Plasmas are sources of electrons for charge neutralizing ion beams to allow them to focus to small spot sizes and compress their axial pulse length. Sources must operate at low pressures and without strong electric/magnetic fields. To produce meter-long plasmas, sources based on ferroelectric ceramics with large dielectric coefficients were developed. The sources use BaTiO<sub>3</sub> ceramic to form plasma. The drift tube inner wall of the Neutralized Drift Compression Experiment (NDCX) is covered with ceramic and  $\sim 7$  kV is applied across the wall of the ceramics. A 20-cm-long prototype source produced plasma densities of  $5 \cdot 10^{11}$  cm<sup>-3</sup>. It was integrated into the Neutralized Transport Experiment and successfully neutralized the K<sup>+</sup> beam. A one-meter-long source comprised of five 20-cm-long sources has been tested and characterized, producing relatively uniform plasma over the length of the source in the  $1 \cdot 10^{10}$  cm<sup>-3</sup> range. This source was integrated into NDCX for beam compression experiments. Experiments with this source yielded compression ratios  $\sim 80$ . Future work will consider longer and higher plasma density sources to support beam compression and high energy density experiments.